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(54) **Method and diluted cleaning composition for the cleaning of hard surfaces.**

(57) The present invention encompasses a method for the cleaning of hard surfaces wherein a cleaning composition comprising an alkanolamine is diluted and subsequently applied to said hard surfaces.

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Technical field

The present invention relates to the cleaning of hard surfaces. Hard surface cleaning compositions comprising alkanolamines are diluted before use, and exhibit outstanding cleaning performance.

Background

Hard surface cleaning compositions are well known in the art. It is known to use various alkanolamines in these compositions. Alkanolamines are typically used for their buffering or hydrotrope properties. Such compositions are described for instance in EP 165 885 and EP 337 576. Concentrated compositions comprising alkanolamines are described for instance in EP 261 874, EP 316 726 and EP 282 863; the compositions of EP 282 863 comprise a large amount of builder.

It has now been found that hard surface cleaning compositions comprising an alkanolamine or mixtures thereof at above-buffering levels could be formulated which exhibit outstanding cleaning performance upon dilution, compared to the same compositions without alkanolamine, while the cleaning performance of the neat, i.e. undiluted compositions is similar, regardless of the presence of alkanolamine. In other words, it has now been found that hard surface cleaning compositions comprising an alkanolamine or mixtures thereof exhibit outstanding cleaning performance, especially on greasy and particulate soils, when used diluted. The compositions according to the present invention are particularly suitable for use on bathroom and kitchen surfaces.

This invention is particularly useful because it allows to formulate compositions with reduced levels of other ingredients, which yet retain optimal cleaning performance, due to the alkanolamine; also, the user needs less product to achieve the same task. This is particularly valuable in terms of environmental compatibility.

Summary of the invention

The present invention thus encompasses a method for the cleaning of a hard surface wherein a cleaning composition comprising conventional cleaning ingredients and from 0.1% to 10% by weight of an alkanolamine or mixtures thereof, is diluted in 10 to 150 times its weight of water so as to obtain a diluted cleaning composition comprising from 0.001% to 1% by weight of said alkanolamine, and wherein said diluted cleaning composition is subsequently applied to said hard surface. The present invention also encompasses the diluted hard-surface cleaning composition thus obtained, comprising from 0.001% to 1% by weight of an alkanolamine, or mixtures thereof.

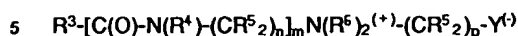
Detailed description of the invention

The present invention encompasses a method wherein a hard surface cleaning composition is used in diluted form. Said compositions comprise an alkanolamine, or mixtures thereof, as well as conventional ingredients such as surfactants, builders, solvents and others.

The hard surface cleaning compositions to be used in the method according to the present invention comprise an alkanolamine, or mixtures thereof; the compositions to be used in the method according to the present invention comprise from 0.1% to 10 % by weight of the undiluted compositions of an alkanolamine, preferably from 1% to 5%, most preferably from 2% to 4% by weight of the undiluted compositions; at such levels, the alkanolamine has a buffering effect in the undiluted product, as well as the desired and unexpected cleaning boosting effect in the diluted compositions. Suitable alkanolamines include monoalkanolamines, dialkanolamines, trialkanolamines, alkylalkanolamines and dialkylalkanolamines. Preferred alkanolamines to be used according to the present invention include monoethanolamine, triethanolamine, aminoethylpropanediol, 2-aminomethyl propanol, and ethoxyethanolamine. Particularly preferred are monoethanolamine and ethoxyethanolamine.

The hard surface cleaning compositions to be used in the method according to the present invention may further comprise a surfactant system. Suitable surfactants useful herein include well-known synthetic anionic, nonionic amphoteric and zwitterionic surfactants and mixtures thereof. Typical of these are the C<sub>10-18</sub> alkyl benzene sulfates and sulfonates, paraffin sulfonates, sulfonates of fatty acids and of fatty acid esters, all of which being commonly used in the form of their sodium, potassium or triethanolammonium salts, alkoxylated (especially thoxylated) C<sub>10-18</sub> alcohols comprising from 3 to 17 ethylenic oxide groups per molecule of hydrophobic moiety, amine oxides, betaines, sulphotetaines and the like, which are well-known in the detergent art. Suitable amine oxides for use herein are of the formula R<sub>1</sub>R<sub>2</sub>R<sub>3</sub>N-O wherein R<sub>1</sub>

typically is a linear or branched  $C_{8-18}$  alkyl group, preferably  $C_{10-16}$ , most preferably linear  $C_{12-14}$ , and  $R_2$  and  $R_3$  are  $C_{1-4}$  alkyl groups, preferably methyl. Suitable betaines and sulfobetaines for use herein are of the formula:



wherein each Y is a carboxylate or sulfonate group; wherein each  $R^3$  is a hydrocarbon, e.g. an alkyl or alkylene group containing from 8 to 20, preferably 10 to 18, most preferably 12 to 16 carbon atoms; wherein each ( $R^4$ ) is either hydrogen, or a short alkyl chain, or substituted alkyl chain containing from 1 to 4 carbon atoms, preferably methyl, ethyl, propyl, hydroxy substituted ethyl or propyl and mixtures thereof, preferably methyl; wherein each ( $R^5$ ) is hydrogen or hydroxy group; wherein ( $R^6$ ) is like ( $R^4$ ) except preferably not hydrogen; wherein m is 0 or 1; and wherein each n and p are a number from 1 to 4, preferably 2 to 3, more preferably 3; there being not more than one hydroxy group in any ( $CR^5_2$ ) moiety. The  $R^3$  groups can be branched and/or unsaturated.

Preferred betaines are those wherein m is 1 and Y is a sulfonate group, and those wherein m is 0 and Y is carboxylate. It is particularly desirable to use the amine oxides and betaines described herein above in the hard surface cleaning compositions to be used in the method according to the present invention; indeed, it has been observed that hard surface cleaning compositions comprising said amine oxides and/or betaines exhibit outstanding grease cleaning and shine performance upon dilution compared to similar compositions without said amine oxides and/or betaines, while the performance of the neat i.e. undiluted compositions is similar. Said benefits are particularly advantageous in hard water conditions, i.e. when the neat product is diluted with hard water; in such conditions, the performance of compositions without said amine oxides and/or betaines dramatically drops upon dilution with hard water compared to soft water, whereas compositions comprising said amine oxides and/or betaines retain acceptable performance. The hard surface cleaning compositions to be used in the method according to the present invention comprise up to 10% by weight of the undiluted composition of a surfactant system, preferably from 1% to 5%. A preferred surfactant system for use herein comprises a mixture of an anionic surfactant, preferably a  $C_{12-18}$  paraffin-sulfonate, with a nonionic surfactant, preferably an ethoxylated alcohols of the formula  $RO-(CH_2CH_2O)_nH$  with R being  $C_{12-15}$  alkyl chain and n being a number from 3 to 10, and an amine oxide or a betaine or a sulfobetaine as described hereinabove.

Suitable builders for the hard surface cleaning compositions to be used in the method according to the present invention include the nitrilotriacetates (NTA), polycarboxylates, citrates, water-soluble phosphates such as tri-polyphosphate and sodium ortho- and pyrophosphates, silicates, ethylene diamine tetraacetate (EDTA), aminopolyphosphonates (DEQUEST), ether carboxylate builders such as in EP-A-286 167, phosphates, iminodiacetic acid derivatives such as described in EP-A-317 542, EP-262 112 and EP-A-399 133, and mixtures thereof. Preferred builders/sequestrants for use herein are selected from Tetrapotassium pyrophosphate, citric acid and sodium carbonate. The hard surface cleaning compositions to be used in the method according to the present invention comprise up to 15% by weight of the undiluted composition of a builder, preferably from 6% to 10%.

Suitable solvents for incorporation in the compositions to be used in the method according to the present invention include propylene glycol derivatives such as n-butoxypropanol or n-butoxypropoxypropanol, water-soluble CARBITOL<sup>®</sup> solvents or water-soluble CELLOSOLVE<sup>®</sup> solvents; water-soluble CARBITOL<sup>®</sup> solvents are compounds of the 2-(2-alkoxyethoxy)ethanol class wherein the alkoxy group is derived from ethyl, propyl or butyl; a preferred water-soluble carbitol is 2-(2-butoxyethoxy)ethanol also known as butyl carbitol. Water-soluble CELLOSOLVE<sup>®</sup> solvents are compounds of the 2-alkoxyethoxy ethanol class, with 2-butoxyethoxyethanol being preferred. Other suitable solvents to be used with the solvents of the invention are also benzyl alcohol, and diols such as 2-ethyl-1, 3-hexanediol and 2,2,4-trimethyl-1,3-pentanediol and mixtures thereof. Preferred solvents for use herein are n-butoxypropoxypropanol, butyl carbitol<sup>®</sup> and mixtures thereof. The compositions to be used in the method according to the present invention comprise up to 15 % by weight of the undiluted compositions of a solvent, preferably from 3% to 10%.

The compositions to be used in the method according to the present invention may also comprise minor ingredients to provide aesthetic or additional product performance benefits. Typical minor ingredients include perfumes, dyes, optical brighteners, soil suspending agents, detergents, glycol-control agents, thickeners, freeze-thaw stabilizers, bactericides, preservatives, and the like.

In the method for the cleaning of hard surfaces according to the present invention, a hard surface cleaning composition comprising conventional cleaning ingredients and from 0.1% to 10% by weight of an alkanolamine or mixtures thereof is diluted in 10 to 150 times its weight of water, preferably 50 to 100, so

as to obtain a diluted cleaning composition comprising from 0.001% to 1% of said alkanolamine, preferably from 0.007% to 0.5%, most preferably 0.01% to 0.4%, and said diluted cleaning composition is applied to said hard surface.

Diluted cleaning compositions according to the present invention comprise up to 1.5% of a surfactant, preferably from 0.04% to 1%, up to 1.5% of a solvent, preferably from 0.02% to 1%, up to 1.5% of a builder, preferably 0.04% to 1% and from 0.001% to 1% of an alkanolamine, preferably from 0.007 to 0.5%. The diluted compositions according to the invention comprise at least one of the above mentioned ingredients, other than the alkanolamine.

The diluted compositions thus obtained exhibit outstanding cleaning performance, especially on greasy and particulate soils. The diluted compositions according to the present invention are especially suitable for use on bathroom and kitchen surfaces such as floors, cupboard tops, walls, tiles and wash surfaces.

The present invention is illustrated by the following examples.

#### Examples

The following compositions were tested for their cleaning performance along the following protocol. Standard enamel plates were soiled by applying on them a grease/particulate matter and then baking them. The tested compositions were then applied on a sponge and then placed onto a Gardner Machine. The Gardner machine measured the number of strokes needed to reach 100% clean plates. The performance was measured for the following compositions as such (i.e. undiluted) and upon dilution at 1.5% in water.

#### Example 1

Composition:	#1	#2
Tetrapotassium pyrophosphate	10	10
Dodecylbenzenesulphonic acid	1	1
n-butoxypropoxypropanol	2.5	2.5
butylcarbitol	7	7
monoethanolamine	0	2
water & minors	up to 100%	
Performance: (No of strokes)		
Undiluted:	8	8
Diluted:	34	10

The above result shows that the use of diluted compositions according to the present invention provides a significant benefit in grease cleaning, compared to the same composition without alkanolamine.

Example 2

5	Composition:	#3	#4
	Citric acid	10	10
	Dodecylbenzenesulphonic acid	1	1
10	n-butoxypropoxypropanol	2.5	2.5
	butylcarbitol	7	7
	monoethanolamine	0	5
15	water & minor	up to 100%	
	Performance: (No of strokes)		
20	Undiluted :	5	5
	Diluted	100	23

25 The above result shows that the use of diluted composition according to the present invention provides a significant benefit in grease cleaning, compared to the same composition without alkanolamine.

Example 3

30	Composition:	#5	#6
	Tetrapotassium pyrophosphate	10	8
35	Dodecylbenzenesulphonic acid	1	1
	n-butoxypropoxypropanol	2.5	2.5
	butylcarbitol	7	7
40	monoethanolamine	0	2
	water & minors	up to 100%	
	Performance: (No of strokes)		
45	Undiluted:	8	8
	Diluted	41	7

50 The above result shows that the present invention allows to formulate concentrated compositions having a reduced level of some ingredients (here builder) while maintaining performance upon dilution.

Example 4

Composition:	#7	#8
Citric acid	10	6
Ethoxylated alcohol	2.5	2.5
Dodecylbenzenesulphonic acid	2.5	2.5
n-butoxypropoxypropanol	5	5
Aminoethylpropanediol	0	4
water & minors	up to 100%	
Performance: (No of strokes)		
Undiluted:	10	10
Diluted	93	16

The above result shows that the present invention allows to formulate concentrated compositions having a reduced level of some ingredients (here builder) while maintaining performance upon dilution.

Example 5:

Composition:	#9	#10
Tetrapotassium pyrophosphate	12	12
Ethoxylated alcohol	2	0
Sodium paraffin sulphonate	1	0
Fattyamine oxide	0	1.5
n-butoxypropoxypropanol	1.8	1.8
Butyl carbitol	5.1	5.1
Ethoxyethanolamine	1	1
water + minor	up to 100%	
Performance: (no. of strokes)		
Undiluted:	11	10
Diluted (with hard water):	22	14

The above results illustrate the benefits obtained from using an amine oxide surfactant, when the composition is diluted in hard water.

Further Examples:

The following compositions were made by mixing the listed ingredients in the listed proportions.

Composition:		#11	#12	#13	#14	#15	#16
5	Tetrapotassium pyrophosphate	10	10	10	10	10	10
	Sodium paraffin sulphonate	0	0	0	0	0.75	0.5
	Ethoxylated alcohol	0	0	0	0	2.25	1
10	Fattyamine oxide	1.5	2	2	0	0	0
	Dimethylalkylbetaine	0	0	0	3	0	1.7
15	n-butoxypropoxypropanol	2.5	0	1.8	1.8	1.8	1.8
	Butyl carbitol	7.0	9.5	5.1	5.1	5.1	5.1
	Triethanolamine	0	0	2	0	0	0
20	Monoethanol amine	0	1	0	0	0	0
	Methyldiethanolamine	0	0	0	2	0	0
	Ethoxyethanolamine	1	0	0	0	0	1
25	Triisopropylamine	0	0	0	0	2	0
	water + minor	up to 100%					

## 30 Claims

1. A method for the cleaning of a hard surface wherein a cleaning composition comprising conventional cleaning ingredients and from 0.1% to 10% by weight of an alkanolamine or mixtures thereof is diluted in 10 to 150 times its weight of water so as to obtain a diluted cleaning composition comprising from 0.001% to 1% by weight of said alkanolamine, and wherein said diluted cleaning composition is subsequently applied to said hard surface.
2. A method according to claim 1 wherein said diluted cleaning composition comprises from 0.007% to 0.5% by weight of alkanolamine.
3. A method according to claim 2 wherein said diluted cleaning composition comprises from 0.01% to 0.4% by weight of alkanolamine.
4. A method according to any of the preceeding claims wherein the alkanolamine is selected from the group of monoethanolamine, triethanolamine, aminoethylpropanediol, 2-amino 2-methyl 1-propanol ethoxyethanolamine or mixtures thereof.
5. A method according to any of the preceeding claims wherein said cleaning composition additionally comprises an amine oxide or a betaine surfactant, or mixtures thereof.
6. A diluted cleaning composition which comprises:
  - up to 1.5% by weight of a surfactant system,
  - up to 1.5% by weight of a solvent
  - up to 1.5% by weight of a builder
  - from 0.001% to 1% by weight of alkanolamine,
 said composition comprising at least one of the above mentioned ingredients other than the alkanolamine

7. A diluted cleaning composition according to claim 6, which comprises:

- from 0.04% to 1% by weight of a surfactant system;
- from 0.02% to 1% by weight of a solvent;
- from 0.04% to 1% by weight of a builder;
- from 0.007% to 0.5% by weight of an alkanolamine

8. A diluted cleaning composition according to claim 7, which comprises:

- from 0.04% to 1% by weight of a mixture of an anionic surfactant with a nonionic surfactant and an amine oxide or a betaine or sulfobetaine.
- from 0.02% to 1% by weight of a mixture of butyl Carbitol and n-butoxypropoxypropanol;
- from 0.04% to 1% by weight of tetrapotassium pyrophosphate;
- from 0.007% to 0.5% by weight of monoethanolamine or ethoxyethanolamine.





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## EUROPEAN SEARCH REPORT

Application Number

EP 91 87 0109

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 5)
X	EP-A-0 393 772 (PROCTER & GAMBLE) * Page 3, lines 5-36; claims *	1-4, 6	C 11 D 3/30
A	---	7-8	
E	WO-A-9 111 505 (PROCTER & GAMBLE) * Examples; claims *	1, 2, 4, 5	
X	WO-A-9 100 332 (UNILEVER) * Examples; claims *	1-4	
X	EP-A-0 337 576 (COLGATE-PALMOLIVE) * Claims *	1, 4, 5	
A	---	7, 8	
X	DE-A-3 434 681 (BMW) * Whole document *	1-4	
A	---	6, 7	
A	EP-A-0 328 174 (PROCTER & GAMBLE) * Claims *	8	
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			TECHNICAL FIELDS SEARCHED (Int. Cl. 5)
			C 11 D
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	23-03-1992	GOLLER P.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	